

Assay file

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY^{1/}

Core samples from Savage Oil-Shale Development Company's Whiskey corehole drilled in the NE. 1/4 of sec. 24, T. 4 S., R. 98 W., Garfield County, Colorado

Surface elevation 7561 feet Mahogany marker at 547.5 feet Total depth 623 feet

From	To	Description
0	31.0	No recovery.
31.0	31.9	Siltstone, tan and light gray, massive. Scattered vegetation fragments. Some vertical fracture with iron-stained fracture faces.
31.9	33.0	Marlstone, tan and light brown, poorly defined to well defined bedding. Some iron staining. Low grade.
33.0	46.0	Siltstone, light gray and blue gray, massive. Common scattered vegetation fragments. Common vertical fracture with iron-stained fracture faces. 3.7 feet of no recovery within this interval.
46.0	53.0	Siltstone, light gray, massive. Common beds 0.7 foot and less of light brown marlstone with poorly defined bedding. Common inclusions 1/2 inch and less of pyrite.
53.0	59.7	Siltstone, light gray, massive. Rare stringers of light brown marlstone. Common scattered vegetation fragments and pyrite grains.
59.7	64.6	Marlstone, tan and light brown, well defined bedding. Two 0.3-foot bands of light gray, massive, calcareous siltstone occur at 61.2 and 61.9 feet. Low grade.
64.6	65.0	Marlstone, dark brown and dark gray, well defined bedding. Good grade.
65.0	72.0	Marlstone, tan and light brown, poorly defined to well defined bedding. Low grade to barren. Common 0.6-foot and less bands of light gray, massive siltstone. Core badly broken.
72.0	92.8	No recovery.
92.8	99.7	Siltstone and silty marlstone, tan and light gray, generally massive to poorly defined and lightly contorted bedding. Barren.
99.7	109.7	No recovery.
109.7	112.0	Siltstone, light gray, massive. Interbedded with 1-inch and less bands of very fine grained sandstone.
112.0	113.5	No recovery.
113.5	129.0	Marlstone, tan and light gray, poorly defined to well defined bedding. Interbedded with light gray, massive siltstone. Barren. Some vertical fracture with fracture faces lightly coated with pyrite grains.
129.0	141.0	Marlstone, silty, tan and light gray, well defined and highly contorted bedding. Barren. Some vertical fracture.
141.0	143.1	Marlstone, tan and light brown, well defined bedding.

By H. N. Smith

Illustration No. SBR-2716P

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Core samples from Savage Oil-Shale Development Company's Whiskey corehole drilled in the NE. 1/4 of sec. 24, T. 4 S., R. 98 W., Garfield County, Colorado (Con.)

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From	To	Description
143.1	151.0	Siltstone, tan and light gray, massive. Common stringers of light brown barren marlstone.
151.0	153.0	No recovery.
153.0	154.0	Siltstone, light gray, massive.
154.0	157.3	Marlstone, tan and light brown, poorly defined to well defined and lightly contorted bedding. Barren.
157.3	160.2	Siltstone, light gray, massive.
160.2	167.7	Marlstone, tan and light brown, poorly defined to well defined and contorted bedding. Rare bands 0.4 foot and less of light gray massive siltstone. Barren.
167.7	171.9	Siltstone, tan and light gray, massive. Common 1/4-inch and less inclusions of pyrite.
171.9	174.7	Marlstone, tan and light brown, poorly defined to well defined bedding. Common inclusions 1/2 inch and less of blue-gray analcite. Low grade to barren.
174.7	175.8	Marlstone, dark brown and dark gray, well defined bedding. A 1-inch band of light gray siltstone occurs at 175.6 feet. Good grade.
175.8	176.3	Marlstone, tan and light brown, well defined bedding. Barren.
176.3	184.2	Siltstone, tan and light gray, massive. Some vertical fracture with fracture faces lightly coated with pyrite grains.
184.2	186.8	Sandstone, tan and light gray, fine grained, massive. Common bands grading to siltstone. Rare 1/2 inch and less inclusions of pyrite.
186.8	192.8	Siltstone, tan and light gray, massive. Rare stringers of light brown marlstone. Some vertical fracture with iron-stained fracture faces.
192.8	196.4	Marlstone, light brown and dark brown, well defined and contorted bedding. Low grade.
196.4	205.1	Siltstone, tan and light gray, massive. Common bands 0.3 foot and less of light brown marlstone. A 0.3-foot band of dark gray marlstone occurs at 197.2 feet.
205.1	207.3	Siltstone, light gray, massive. Extensive vertical fracture with fracture faces lightly coated with pyrite. One foot of no recovery within this interval.
207.3	211.2	Marlstone, light brown and dark brown, well defined bedding. A 0.4-foot band of light gray siltstone occurs at 208.0 feet. A 0.6-foot band of dark gray marlstone occurs at 208.4 feet. One foot of no recovery within this interval.

Illustration No. SBR-2717P

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From	To	Description
211.2	211.9	Marlstone, dark gray, massive. Good grade.
211.9	218.0	Marlstone, light brown and dark brown, massive to well defined bedding. Common crystal cavities 1-1/2 inches and less filled with light gray and blue-gray calcite crystals. One and one-half feet of no recovery within this interval. Core badly fractured and broken.
218.0	230.0	Marlstone, tan, light brown, and dark brown. Massive to well defined bedding. Common crystal cavities 1-1/2 inches and less filled with blue-gray and clear calcite crystals and coated with reddish-brown bitumen. Calcite partings occur from 229.2 to 230.0 feet. Core fractured and broken. 0.9 foot of no recovery within this interval.
230.0	238.0	Marlstone, light gray, tan and light brown, massive to well defined bedding. Numerous broken zones of poor recovery.
238.0	243.9	Marlstone, light brown, dark brown, and dark gray, generally massive to poorly defined bedding. Rare stringers and inclusions 1/2 inch and less of analcite and calcite crystals. 1.5 feet of no recovery within this interval.
243.9	248.6	No recovery.
248.6	254.1	Marlstone, light gray, light brown, and dark brown, massive to poorly defined and contorted bedding. Common bands 0.3 foot and less of light gray and blue-gray siltstone.
254.1	256.3	Siltstone, light gray, massive.
256.3	260.1	Marlstone, light gray, tan, and light brown, well defined and lightly contorted bedding. A 0.3-foot band of light gray siltstone occurs at 256.7 feet. Low grade. No recovery between 257.0 and 259.0 feet.
260.1	263.0	Marlstone, light brown, dark brown, and dark gray, well defined bedding. A 0.3-foot band of light gray siltstone occurs at 260.9 feet. A 1-inch contorted band of blue-gray analcite occurs at 261.5 feet. Good grade.
263.0	268.2	Siltstone, light gray, massive. Extensive vertical fracture with fracture faces lightly coated with reddish-brown and black bitumen. No recovery between 264.0 and 266.0 feet.
268.2	270.1	Marlstone, light gray and light brown, well defined bedding. Some vertical fracture with fracture faces lightly coated with reddish-brown bitumen.
270.1	273.1	Marlstone, light brown, dark brown, and dark gray, massive to well defined bedding. Some vertical fracture with fracture faces lightly coated with clear calcite crystals and reddish-brown bitumen. Good grade. A 1/2-inch irregular band of tan siltstone containing analcite and calcite crystals occurs at 271.3 feet.

Illustration No. SBR-2718P

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From	To	Description
273.1	277.1	Marlstone, light brown and dark brown, massive to poorly defined bedding. Rare irregular tan analcite stringers. Core badly fractured and broken. Fracture faces are lightly coated with reddish-brown and black bitumen.
277.1	281.5	Marlstone, dark brown and dark gray, generally massive to well defined bedding. Good grade. No recovery between 279.2 and 279.8 feet.
281.5	289.6	Marlstone, silty, tan, and light gray, poorly defined and highly contorted bedding. Interbedded with siltstone, light gray, massive. Some vertical fracture with fracture faces lightly coated with reddish-brown bitumen. No recovery between 283.0 and 289.0 feet.
289.6	291.3	Marlstone, light brown, poorly defined to well defined bedding.
291.3	312.0	Marlstone, light brown and dark brown, massive to well defined bedding. Common stringers of tan calcite-enriched marlstone.
312.0	315.1	Marlstone, light brown and dark brown, well defined bedding. Common vertical fracture with fracture faces lightly coated with reddish-brown bitumen.
315.1	320.0	No recovery.
320.0	321.9	Marlstone, light brown and dark brown, well defined bedding. A 0.4-foot band of tan, massive siltstone occurs at 320.0 feet.
321.9	325.6	Siltstone, tan, massive to poorly defined and irregular bedding. Common stringers of light brown bedded marlstone. Rare vertical fracture with fracture faces iron stained.
325.6	326.4	Marlstone, light brown and dark brown, well defined bedding.
326.4	328.2	Marlstone, dark brown and dark gray, well defined bedding. Good grade.
328.2	336.6	Marlstone, light brown and dark brown, well defined bedding.
336.6	339.7	Marlstone, light brown and dark brown, well defined bedding. Extensive vertical fracture with fracture faces lightly coated with calcite and reddish-brown bitumen.
339.7	341.7	Marlstone, dark brown and dark gray, well defined bedding.
341.7	344.9	Marlstone, light gray and tan, well defined bedding. Low grade.
344.9	347.2	Marlstone, dark brown and dark gray, massive to well defined bedding. A 0.2-foot band of light brown marlstone occurs at 345.3 feet. A 1/2-inch band of tan siltstone occurs at 345.6 feet. Good grade.

Illustration No. SBR-2719P

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From	To	Description
347.2	358.3	Marlstone, light brown and dark brown, massive to well defined bedding. Common vertical fractures with fracture faces lightly coated with calcite and reddish-brown bitumen.
358.3	359.3	Marlstone, dark gray, massive. Good grade.
359.3	367.5	Marlstone, light brown and dark brown, well defined bedding. Some vertical fracture with fracture faces lightly coated with granular pyrite.
367.5	368.3	Marlstone, dark brown and dark gray, massive to poorly defined bedding.
368.3	374.6	Marlstone, light brown and dark brown, generally massive to poorly defined bedding. Common vertical fracture with fracture faces lightly coated with dirty white calcite.
374.6	376.1	Marlstone, dark brown and dark gray, massive to well defined bedding. Good grade.
376.1	379.8	Marlstone, tan and light brown, well defined bedding. Low grade.
379.8	380.8	Marlstone, dark gray, massive to well defined bedding. Rich.
380.8	385.4	Marlstone, light brown and dark brown, massive to poorly defined bedding. Rare vertical fracture with fracture faces lightly coated with dark brown bitumen. One-inch and less fractures occur at 383.0 and at 383.9 feet with fracture faces coated with a light gray film containing analcite, quartz and carbonates. A 1/2-inch band of dark brown bitumen occurs at 385.4 feet.
385.4	389.3	Marlstone, light gray and light brown, well defined bedding. Vertical fracture with fracture faces lightly coated with reddish-brown bitumen.
389.3	395.9	Marlstone, light brown, dark brown, and dark gray, poorly defined to well defined bedding. 0.5-foot bands of tan siltstone containing stringers of dark brown marlstone and small inclusions of analcite crystals and black bitumen occur at 391.5 feet and 393.6 feet.
395.9	397.5	Marlstone, dark brown and dark gray, massive. Good grade to rich.
397.5	400.7	Marlstone, light brown and dark brown, well defined bedding. A 0.1-foot band of tan siltstone containing stringers of dark brown marlstone occurs at 397.5 feet.

Illustration No. SBR-2720P

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From	To	Description
400.7	401.8	Marlstone, tan and light brown, well defined bedding. Some vertical fracture with fracture faces heavily coated with reddish-brown bitumen.
401.8	412.8	Marlstone, light brown and dark brown, massive to well defined bedding. Common bands 0.2 foot and less of tan siltstone containing stringers of dark brown marlstone. Extensive vertical fracture with faces lightly coated with reddish-brown bitumen. No recovery between 403.0 feet and 405.2 feet and between 407.0 feet and 408.8 feet.
412.8	416.6	Marlstone, tan, light brown and dark brown, well defined bedding. Some vertical fracture with fracture faces lightly coated with calcite and reddish-brown bitumen.
416.6	417.6	Marlstone, dark brown and dark gray, poorly defined to well defined bedding. Good grade.
417.6	418.6	Siltstone, tan, massive. Contains numerous irregular stringers of dark brown marlstone. A 0.1-foot band of dark brown marlstone occurs at 417.7 feet.
418.6	423.6	Marlstone, light brown and dark brown, massive to well defined bedding. Some vertical fracture with fracture faces lightly coated with clear calcite. A 0.3-foot band of tan siltstone containing stringers of dark brown marlstone occurs at 419.4 feet.
423.6	434.0	Marlstone, light brown and dark brown, massive to well defined bedding. A 0.2-foot band of tan siltstone containing stringers of dark brown marlstone occurs at 424.9 feet. No recovery from 426.4 feet to 432.5 feet.
434.0	439.4	Marlstone, light brown and dark brown, poorly defined to well defined and slightly contorted bedding. Rare contorted stringers of light gray analcite. Some vertical fracture with fracture faces lightly coated with calcite and reddish-brown bitumen.
439.4	440.5	Marlstone, dark brown, massive, uniform.
440.5	445.0	Marlstone, light brown and dark brown, massive to well defined bedding. Extensive vertical fracture with fracture faces lightly coated with reddish-brown bitumen. A 0.4-foot vuggy area containing abundant calcite occurs at 442.1 feet.
445.0	457.1	Marlstone, light brown, dark brown, and dark gray, massive to well defined bedding. Some vertical fracture.

Illustration No. SBR-2721P

Laramie Petroleum Research Center, Laramie, Wyoming

April 16, 1959

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From	To	Description
457.1	460.3	Analcitized tuff, very fine grained, tan and light gray. Numerous bands 1-1/2 inches and less and contorted stringers of dark brown marlstone. (Upper wavy bed.)
460.3	475.2	Marlstone, dark brown, massive to well defined bedding. Common stringers 1 inch and less long of dark brown analcite. Rare crystal cavities 1 inch and less lined with calcite crystals. Good grade.
475.2	483.0	Marlstone, tan and light brown, massive to poorly defined bedding. Rare vertical fracture with fracture faces lightly coated with clear calcite. A 45° fracture showing slickensides occurs at 477.5 feet.
483.0	487.0	Marlstone, dark brown, massive to poorly defined bedding. A 0.2-foot band of vuggy marlstone containing calcite crystals* occurs at 485.0 feet.
487.0	490.6	Marlstone, light gray, light brown and dark brown, well defined bedding. Extensive vertical fracture with fracture faces lightly coated with reddish-brown bitumen and a bluish-white film.
490.6	498.6	Marlstone, light brown, dark brown, and dark gray, poorly defined to well-defined bedding.
498.6	499.6	Marlstone, dark gray, massive. Some vertical fracture. Rich.
499.6	505.8	Marlstone, light brown and dark brown, massive to poorly defined bedding. Extensive vertical fracture with fracture faces lightly coated with light gray calcite.
505.8	508.7	Marlstone, tan and light brown, well defined bedding. Some vertical fracture with fracture faces lightly coated with clear calcite.
508.7	515.7	Marlstone, dark brown and dark gray, massive to well defined bedding. Rare inclusions 1-1/2 inches and less of dark brown analcite.
515.7	519.0	Marlstone, light gray and light brown, well defined bedding. Low grade. Extensive vertical fracture.
519.0	520.6	Marlstone, dark brown and light brown, massive to well defined bedding. Some vertical fracture with fracture faces lightly coated with calcite and reddish-brown bitumen. A 0.2-foot band of light gray massive siltstone occurs at 520.0 feet.
520.6	526.6	(Marlstone, tan and light gray, well defined bedding. A-groove { Rare vertical fracture. Low grade to barren.

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From	To	Description
526.6	527.9	Marlstone, light brown and dark brown, massive to well defined bedding.
527.9	531.8	Marlstone, tan and light brown, well defined bedding. Common bands 1 inch and less of tan analcitized tuff. No recovery from 530-531.2 feet.
531.8	539.7	Marlstone, light brown, dark brown, and dark gray, massive to well defined bedding. Common stringers and bands 1 inch and less of tan analcite tuff. A 0.4-foot band of tan analcite tuff occurs at 534.7 feet.
539.7	547.5	Marlstone, light brown, dark brown, and dark gray, massive to well defined bedding. Rare vertical fracture.
547.5	548.1	Analcite, light gray, vuggy. A 0.1-foot band of light brown and dark brown marlstone occurs at 547.6 feet. (Mahogany marker.)
548.1	551.4	Marlstone, light brown and dark brown, well defined bedding. A 1/2-inch band of light gray analcite occurs at 551.3 feet.
551.4	552.6	Marlstone, dark gray, massive. Rich.
552.6	560.7	Marlstone, light brown, dark brown, and dark gray, massive to well defined bedding. Good grade to rich.
560.7	561.7	Marlstone, dark gray and dark brown, well defined bedding. Rich.
561.7	570.6	Marlstone, light brown, dark brown, and dark gray, well defined bedding.
570.6	572.6	Marlstone, dark gray, massive to well defined bedding. Rich.
572.6	580.0	Marlstone, light brown and dark brown, massive to well defined bedding. Common bands 0.2 foot and less of light gray siltstone.
580.0	583.5	Marlstone, light brown and dark brown, massive to poorly defined bedding. Core badly fractured and broken. Fracture faces are lightly coated with calcite and iron stain.
583.5	587.0	No recovery.
587.0	589.3	Marlstone, dark brown and dark gray, massive to well defined bedding. Rich.
589.3	591.5	Marlstone, light brown and dark brown, massive to well defined bedding.
591.5	593.3	Marlstone, dark brown and dark gray, massive to well defined bedding.

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From	To	Description
593.3	596.0	Marlstone, light brown and dark brown, massive to well defined and slightly contorted bedding.
596.0	604.1	Marlstone, light brown and dark brown, generally massive to well defined bedding.
604.1	605.8	Marlstone, tan, light brown, and dark brown, well defined bedding.
605.8	610.2	Marlstone, light brown and dark brown, massive to well defined bedding. Core badly fractured and broken.
610.2	613.0	No recovery.
613.0	615.5	Marlstone, light brown, dark brown, and dark gray, well defined bedding. Core badly fractured and broken.
615.5	617.4	Marlstone, dark brown and dark gray, well defined bedding. Rich.
617.4	623.0	Marlstone, light brown and dark brown, well defined bedding. Common bands 0.4 foot and less of dark gray rich marlstone.
623.0		Bottom of hole.

X-ray diffraction patterns were obtained on the following samples:

243	Found to be analcite with calcite.
384	Found to consist of analcite, quartz, dolomite, and calcite.

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Illustration No. SBR-2724P

Laramie Petroleum Research Center, Laramie, Wyoming

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